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(54) **COMMUNICATING DISCOVERY INFORMATION FROM REMOTE CONTROL DEVICES**

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Related U.S. Application Data

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G08C 19/28	(2006.01)
G08C 23/04	(2006.01)

(52) **U.S. Cl.**
CPC ***G08C 23/04*** (2013.01); *G08C 19/28* (2013.01); *H04N 7/142* (2013.01)

(58) **Field of Classification Search**
None
See application file for complete search history.

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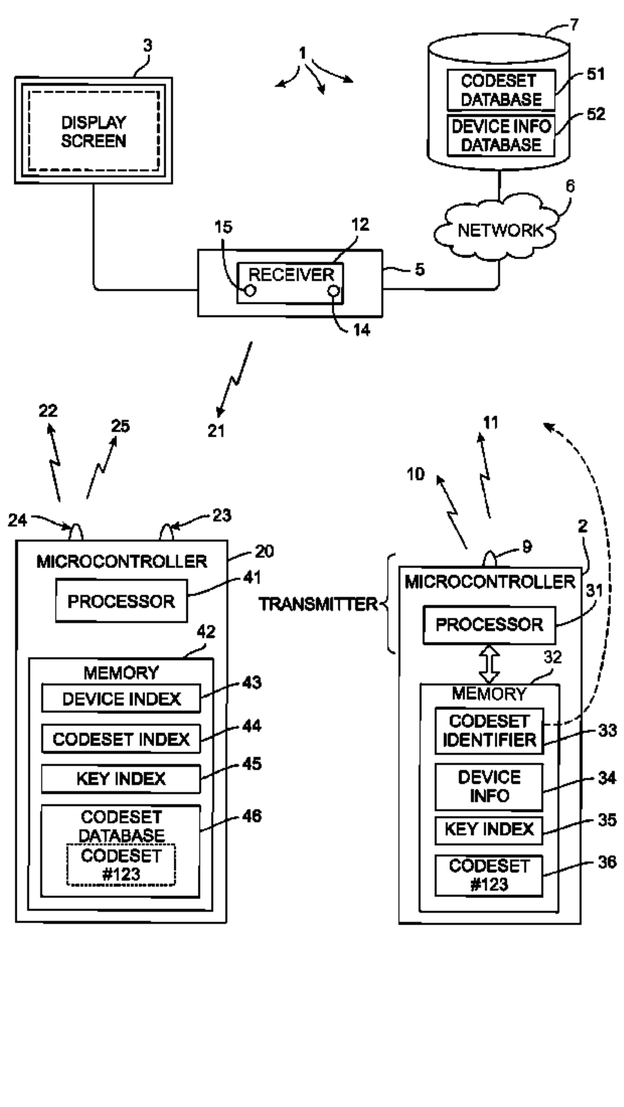
(57) **ABSTRACT**

A set top box receives from a remote control device one or more of a codeset identifier, data indicative of a brand and model for a consumer electronic device, and remote control diagnostic information. The set top box then causes information representative of the received codeset identifier, data indicative of a brand and model for a consumer electronic device, and remote control diagnostic information to be displayed in a display device associated with the set top box.

13 Claims, 4 Drawing Sheets



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2005/0078226	A1	4/2005	Matoba	
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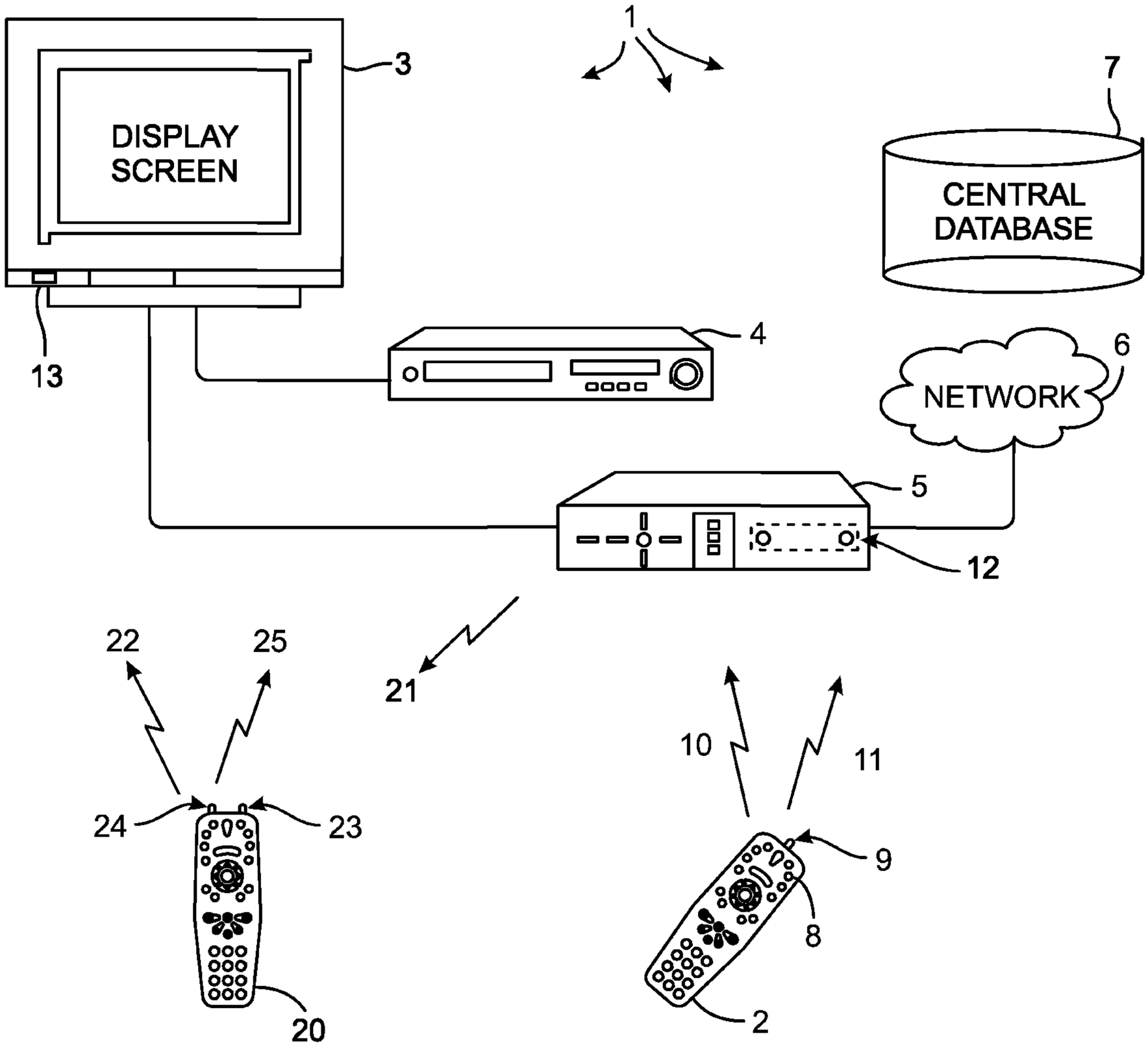

DISPLAY SCREEN
3
1
7
CENTRAL DATABASE
4
6
NETWORK
13
5
12
22
25
21
24
23
10
11
9
8
20
2

FIG. 1

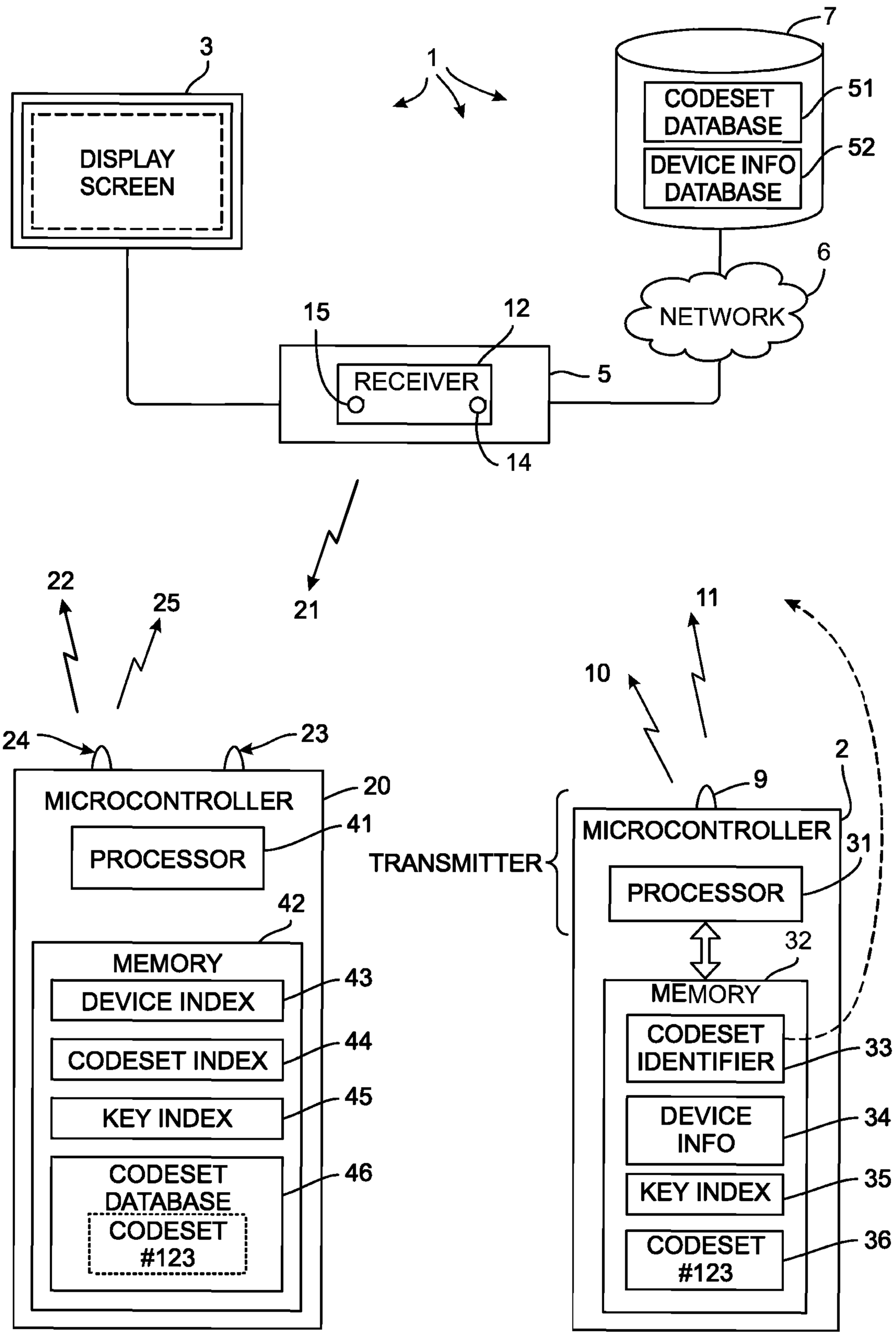

3
DISPLAY SCREEN
1
7
CODESET DATABASE
51
DEVICE INFO DATABASE
52
6
NETWORK
15
12
RECEIVER
5
14
21
22
25
24
23
MICROCONTROLLER
20
PROCESSOR
41
42
MEMORY
DEVICE INDEX
43
CODESET INDEX
44
KEY INDEX
45
CODESET DATABASE
CODESET #123
46
TRANSMITTER
11
10
2
9
MICROCONTROLLER
31
PROCESSOR
32
MEMORY
CODESET IDENTIFIER
33
DEVICE INFO
34
KEY INDEX
35
CODESET #123
36

FIG. 2

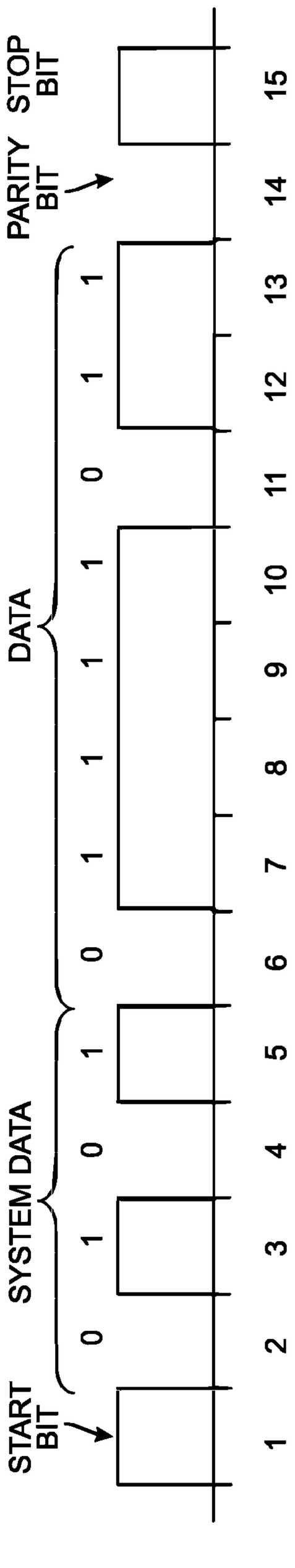

PARITY BIT
STOP BIT
DATA
BINARY TRANSMISSION
0 1 1 1 1 0 1 1
6 7 8 9 10 11 12 13 14 15

FIG. 3

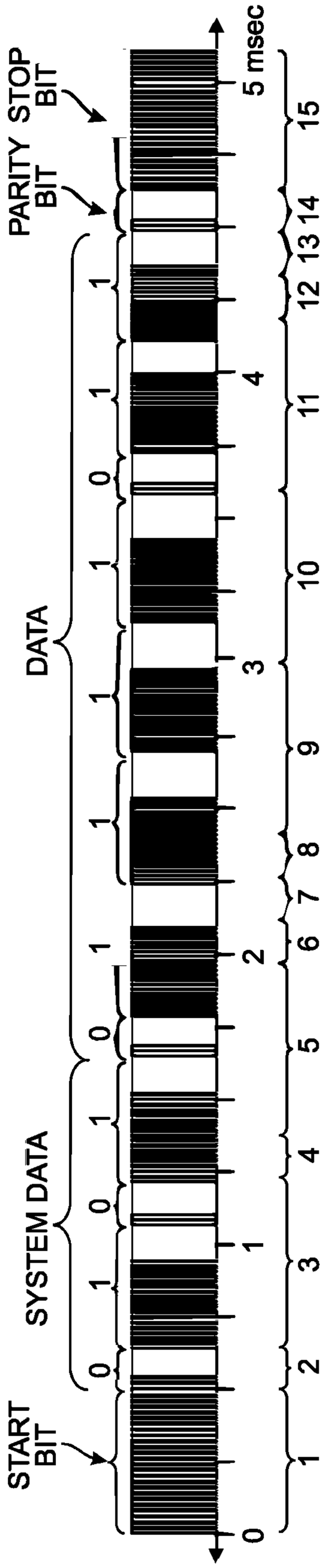
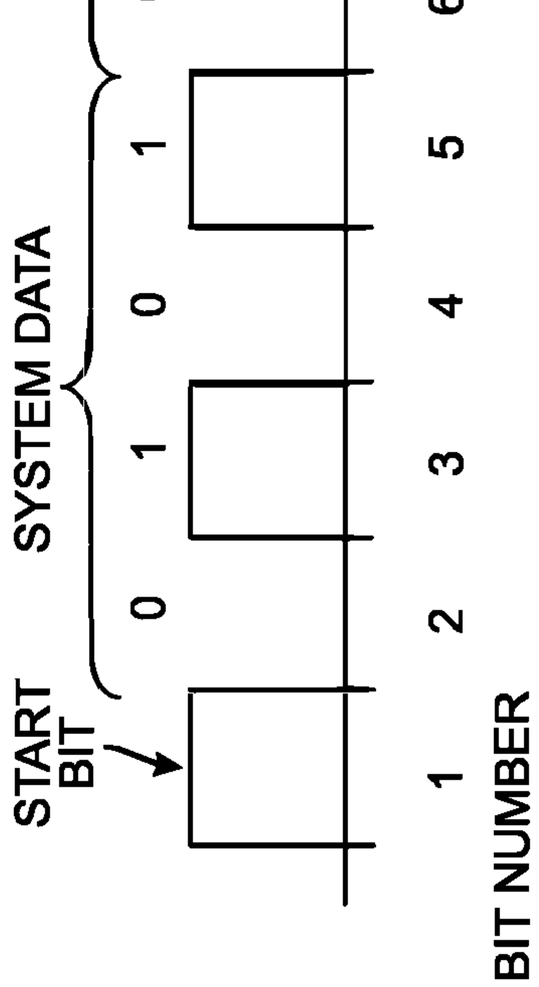

PARITY BIT
STOP BIT
5 msec
DATA
PULSE WIDTH MODULATION
1 1 1 0 1 1 0 1
2 6 7 8 9 10 11 12 13 14 15

FIG. 4


START BIT
SYSTEM DATA
BIT NUMBER
0 1 0 1 0 1 1 1
1 2 3 4 5 6 7 8

START BIT
SYSTEM DATA
BIT NUMBER
0 1 0 1 0 1 1 1
0 1 2 3 4 5 6 7 8

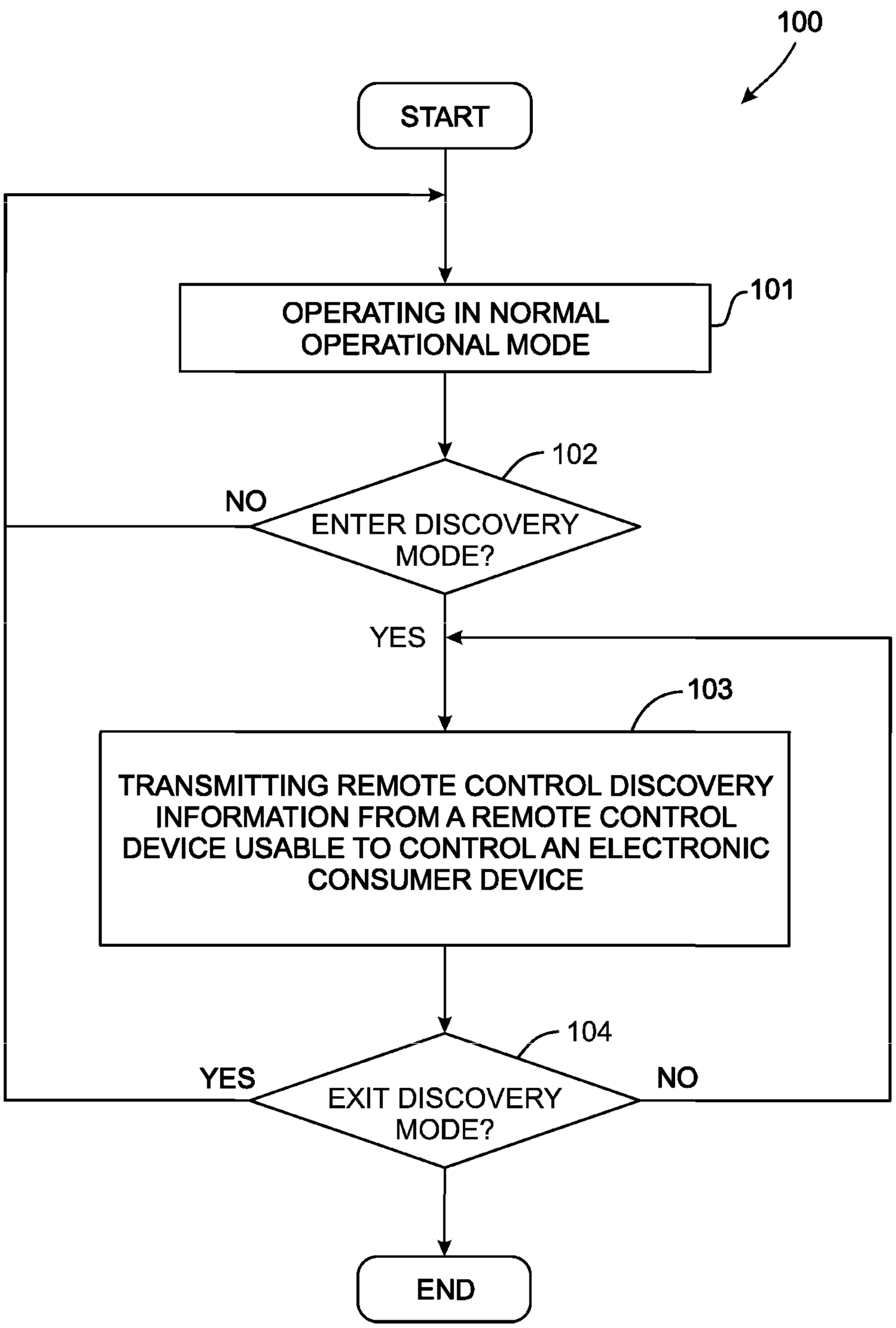

100
START
OPERATING IN NORMAL OPERATIONAL MODE
101
102
NO
ENTER DISCOVERY MODE?
YES
103
TRANSMITTING REMOTE CONTROL DISCOVERY INFORMATION FROM A REMOTE CONTROL DEVICE USABLE TO CONTROL AN ELECTRONIC CONSUMER DEVICE
104
YES
EXIT DISCOVERY MODE?
NO
END

FIG. 5

COMMUNICATING DISCOVERY INFORMATION FROM REMOTE CONTROL DEVICES

RELATED APPLICATION INFORMATION

This application is a continuation of and claims the benefit of U.S. application Ser. No. 16/731,507, filed on Dec. 31, 2019, which application is a continuation of and claims the benefit of U.S. application Ser. No. 15/452,331, filed on Mar. 7, 2017, which application is a divisional of and claims the benefit of U.S. application Ser. No. 12/070,686, filed on Feb. 20, 2008, the disclosures of which are incorporated herein by reference in their entirety.

TECHNICAL FIELD

The disclosed embodiments relate to remote control devices, more specifically, to a method of communicating discovery information from remote control devices.

BACKGROUND

Remote control devices transmit operational signals to control electronic consumer devices such as TVs, VCRs, set-top boxes, audio home theatre systems, and CD/DVD players. Each operational signal communicates a keycode associated with a selected electronic consumer device. Each keycode corresponds to a function of the selected electronic consumer device, such as power on, power off, volume up, volume down, play, stop, select, channel up, channel down, etc. A particular brand and make of electronic consumer device responds to operational signals. Each operational signal encodes a keycode. The electronic consumer device receives the operational signal, decodes the keycode, and in response performs a corresponding function. The set of keycodes (as well as associated system codes, protocol information and/or formatting information) for generating operational signals for a particular electronic consumer device is referred to here as a codeset.

A remote control device uses a particular codeset to control a corresponding electronic consumer device. A universal remote control (URC) device, on the other hand, generally stores hundreds of codesets in a codeset database and can be programmed to use a particular codeset among the codeset database to control a corresponding electronic consumer device.

There are many codesets used in the market. Each codeset is identified by a codeset identifier. Because of the large number of different electronic consumer devices and corresponding codesets, it is difficult to discover the codeset identifier that is used by a particular remote control device. It is also difficult to program a universal remote control device that is capable of controlling a very large number of different electronic consumer devices.

SUMMARY

A method involves communicating remote control discovery information from a remote control device to a receiver. The remote control device is used to control a particular electronic consumer device. The remote control discovery information may, for example, include: a codeset identifier that identifies a codeset stored in the remote control device, device information, diagnostic information, and/or marketing information. The device information may include a device description, and/or device characteristics

information that correspond to the electronic consumer device. The remote control discovery information is transmitted from the remote control device to the receiver as part of a wireless communication.

In one novel aspect, a system includes a remote control device and a receiver. The remote control device is operable in both a normal operational mode and a discovery mode. In the normal operational mode, the remote control device transmits operational signals to control a particular electronic consumer device. In the discovery mode, the remote control device transmits remote control discovery information to the receiver. By transmitting the remote control discovery information from the remote control device, the remote control device and the corresponding electronic consumer device can be easily identified. In addition, the remote control discovery information can be easily collected and used for diagnostic and marketing purposes.

In one example, the receiver is a set-top box. The set-top box is connected to an online central database through a network. Upon receiving the remote control discovery information, the set-top box processes the discovery information and responds accordingly. In one example, the receiver receives a codeset identifier and in response displays the codeset identifier on a display screen. In another example, the receiver receives a codeset identifier and in response retrieves a codeset corresponding to the codeset identifier from the online central database. In addition, the receiver loads the retrieved codeset onto a universal remote control device such that the universal remote control device can control the electronic consumer device.

Other embodiments and advantages are described in the detailed description below. This summary does not purport to define the invention. The invention is defined by the claims.

BRIEF DESCRIPTION OF THE DRAWINGS

The accompanying drawings, where like numerals indicate like components, illustrate embodiments of the invention.

FIG. **1** illustrates a system in accordance with one novel aspect.

FIG. **2** is a simplified block diagram of the system in FIG. **1**.

FIG. **3** illustrates an operational signal using binary transmission.

FIG. **4** illustrates an operational signal using pulse width modulation.

FIG. **5** is a flowchart of a method for transmitting remote control discovery information from a remote control device in accordance with one novel aspect.

DETAILED DESCRIPTION

Reference will now be made in detail to some embodiments of the invention, examples of which are illustrated in the accompanying drawings.

FIG. **1** is a diagram of a system **1** in accordance with one novel aspect. System **1** includes a remote control device **2**, a television (TV) **3**, a VCR/DVD player **4**, a set-top box **5**, a network **6**, an online central database **7**, and a universal remote control device **20**. Remote control device **2** includes a key **8**, a light emitting diode (LED) **9**. In one novel aspect, remote control device **2** is operable in both a normal operational mode and a discovery mode. Typically, a user uses remote control device **2** to control a selected electronic consumer device such as TV **3** in the normal operational

mode. The user may press key **8** on remote control device **2** to turn on/off the power of TV **3**. When the user presses key **8**, remote control **2** emits an operational signal (for instance, an infrared signal) **10** from LED **9**. Operational signal **10** is transmitted to an infrared receiver **13** of TV **3**. Infrared receiver **13** receives operational signal **10**, and recovers the keycode and takes appropriate action, which in this case is to turn on or turn off TV **3**.

As illustrated in FIG. **1**, remote control **2** transmits remote control discovery information **11** when remote control device **2** is in the discovery mode. In one example, a user presses a predefined sequence of keys on remote control device **2** such that remote control device **2** enters into the discovery mode. Remote control device **2** then transmits remote control discovery information **11** to receiver **12**. Remote control device **2** exits the discovery mode and returns back to the normal operational mode after the remote control discovery information **11** is transmitted. In the example of FIG. **1**, receiver **12** is a part of set-top box **5**. After set-top box **5** receives the remote control discovery information **11**, set-top box **5** interprets and processes the remote control discovery information accordingly.

FIG. **2** is a simplified block diagram of the system in FIG. **1**. As illustrated in FIG. **2**, remote control device **2** includes a processor **31** and a memory **32**. Memory **32** includes a codeset identifier **33**, device information **34**, a key index table **35**, and a codeset #123 **36** that is used to control TV **3**. Universal remote control device **20** includes a processor **41** and a memory **42**. Memory **42** includes a device index table **43**, a codeset index table **44**, a key index table **45**, and a codeset database **46**. Online central database **7** includes a codeset database **51** and a device information database **52**. In the example of FIG. **2**, receiver **12** is a part of set-top box **5** and is capable of receiving and transmitting operational signals such as infrared signals. Receiver **12** includes an IR receiver **14** and an IR transmitter **15**.

When remote control device **2** is in its discovery mode, remote control device **2** transmits the remote control discovery information **11** to receiver **12**. In the presently described embodiment, the remote control discovery information **11** includes a unique codeset identifier **33** that is stored in memory **32** of remote control device **2**. In one example, remote control device **2** uses codeset #123 to control TV **3** (for instance, a TOSHIBA TV with model number 42Lx177), and codeset identifier **33** is a three digit number (for instance, number 123 as illustrated in FIG. **2**) that identifies codeset #123. When receiver **12** receives codeset identifier **33**, the three digit number 123 is displayed on a display screen of TV **3** that is connected to receiver **12**. Alternatively, the three digit number 123 is forwarded to online central database **7**. Therefore, by transmitting codeset identifier **33** from remote control device **2**, it can be easily discovered that codeset #123 is used by remote control device **2** to control a TOSHIBA television with model number 42Lx177.

The transmitted codeset identifier **33** can also be used by a user to program a universal remote control device **20** to control TV **3**. If codeset #123 is already stored in codeset database **46** of universal remote control device **20**, then the user simply programs universal remote control **20** to use codeset #123 by entering the three digit number 123 displayed on the display screen of TV **3**. If, however, codeset #123 is not stored in codeset database **46** of universal remote control **20**, then receiver **12** retrieves the actual codeset #123 from codeset database **51** of online central database **7** through network **6**. In addition, receiver **12** transmits an operational signal **21** that includes the actual codeset #123. In the example of FIG. **2**, universal remote control device **20** is a two-way remote control device which includes an IR receiver **23** and an IR transmitter **24**. When operational signal **21** is received by IR receiver **23**, universal remote control device **20** recovers codeset #123 and loads codeset #123 into its codeset database **46** and programs itself to use codeset #123 to control TV **3**.

Codeset identifier **33** is transmitted and received as part of a wireless communication between remote control device **2** and receiver **12**. In the presently illustrated example, infrared signals are transmitted from remote control device **2** and received by receiver **12**. Various protocols may be used in transmitting the infrared signals. FIG. **3** illustrates an infrared signal using binary transmission. In the example of FIG. **3**, the data (codeset identifier **33**) is a sequence of bits 01111011 {equivalent to decimal 123) and is transmitted in the infrared signal as a stream of digital values in binary transmission format.

FIG. **4** illustrates an infrared signal using pulse width modulation. In the example of FIG. **4**, the data (codeset identifier **33**) is modulated onto the infrared signal using pulse width modulation. Digital ones and zeros are characterized by pairs of marks and spaces. A digital zero has a shorter duration of mark time than a digital one.

Although remote control discovery information **11** includes a codeset identifier in the previously described example, remote control discovery information **11** may also include various other types of information such as device information, diagnostic information, and/or marketing information. In one example, remote control discovery information **11** includes the device information of the electronic consumer device (for instance, TV **3**) controlled by remote control device **2**. The device information further comprises information such as a device description and device characteristics information. The device description contains information such as a brand name, a model number, and a device type that describe the electronic consumer device. For instance, the device description may be a text message of "Toshiba TV 42Lx177" that describes an electronic consumer device that is a plasma TV with model number 42LX177 manufactured by Toshiba. Device characteristics information includes operational behavior of the electronic consumer device such as whether the device requires "ENTER" key after DIGIT entry for channel selection, and/or how long it will take from receiving POWER signal to the completion of power on process. Similar to codeset identifier **33**, the device description can also be displayed on a display screen to enable a user to discover what type of electronic consumer device is controlled by remote control device **2**.

In another example, remote control discovery information **11** includes diagnostic information and marketing information. The diagnostic information contains information of remote control device **2** such as how much battery charges are left in remote control device **2** and what is the status of remote control device **2**. Diagnostic information is therefore useful in assisting a user to diagnose any potential problems of remote control device **2**. The marketing information contains information of remote control device **2** such as usage and viewing habit of remote control device **2** used by a particular user. By transmitting the marketing information to online central database **7**, useful information can be gathered and used in marketing and advertising activities.

FIG. **5** is a flowchart of a method **100** for transmitting remote control discovery information from a remote control device in accordance with one novel aspect. As illustrated in FIG. **5**, the remote control device typically operates in the

normal operational mode (step **101**) to control a particular electronic consumer device (for instance, TV **3**). When a user presses a predefined sequence of keys (for instance, MENU key plus ENTER key together) on the remote control device (step **102**), the remote control device enters the discovery mode. In the discovery mode, the remote control device transmits the remote control discovery information (step **103**). As illustrated above, the remote control discovery information may include a codeset identifier, device information, diagnostic information, and/or marketing information. In one example, each type of the remote control discovery information is associated with a specific key on the remote control device. For instance, if the user presses a numeric key "1", then the remote control device transmits a codeset identifier (for instance, a three digit number 123) stored in the remote control device. If the user presses a numeric key "2", then the remote control device transmits device information (for instance, text message "Toshiba TV 42LX177") associated with the electronic consumer device controlled by the remote control device. Finally, if the user presses another predefined sequence of keys (for instance, MENO key plus EXIT key together) on the remote control device (step **104**)$_1$ then the remote control device exits the discovery mode and returns back to its normal operational mode.

In the above described embodiment of FIG. **5**, the remote control device enters a discovery mode in order to transmit the remote control discovery information. In another embodiment, however, the remote control device may not need to have the discovery mode for the purpose of transmitting the remote control discovery information. For example, the remote control device may transmit the remote control discovery information whenever it receives a particular key press or a signal without entering into the discovery mode. Alternatively, the remote control device may transmit the remote control discovery information periodically under a predetermined time interval (for instance, every 10 minutes).

For additional information on codesets, the generation of operational signals, universal remote control devices, their uses and related topics, see: U.S. patent application Ser. No. 10/737,129, filed Dec. 16, 2003, by Daniel SauFu Mui, entitled "Relaying Key Code Signals through a Remote Control Device"; U.S. patent application Ser. No. 10/777,023, filed Feb. 10, 2004, by Lee et al., entitled Interactive Web-Based Codeset Selection And Development Tool"; U.S. patent application Ser. No. 10/928,808, filed Aug. 27, 2004, by Provis et al., entitled "An 8-Bit Register-Based Virtual Machine" (the subject matter of these documents is incorporated herein by reference).

Although certain specific exemplary embodiments are described above in order to illustrate the invention, the invention is not limited to the specific embodiments. For example, remote control device **2** could be a universal remote control device that is capable of transmitting the remote control discovery information. Remote control device **2** could also be a radio frequency (RF) remote control device instead of an infrared (IR) remote control device. Receiver **12** could be a standalone device such as a universal infrared receiver (OIR), a DVR, a DVD recorder, a PC, or any device that supports wireless capabilities. The remote control discovery information could be communicated from one remote control device to another remote control device. In addition, the codeset identifier could be in other format and is not limited to a three digit number as long as it uniquely identifies the corresponding electronic consumer device. Accordingly, various modifications, adaptations, and combinations of various features of the described embodiments can be practiced without departing from the scope of the invention as set forth in the claims.

What is claimed is:

1. A system, comprising:

a first device having a first processing device and a first memory having stored thereon first instructions, the first instructions, when executed by the first processing device, causing the first device to perform steps comprising:

storing in a first location in the first memory a codeset identifier that was provided to the first device to thereby configure the first device with a one of a plurality of command code sets appropriate to communicate commands to a second device via use of a first wireless communications channel, the one of the plurality of command code sets being stored in a second location in the first memory that is different than the first location in the first memory and being used by the first device to transmit command codes to the second device;

retrieving from the first location in the first memory of the first device the codeset identifier; and

transmitting a signal via use of a transmitter of the first device to a third device via use of a second wireless communications channel that is different than the first wireless communications channel, the signal comprising the codeset identifier retrieved from the first location in the first memory.

2. The system as recited in claim **1**, wherein the first device comprises a universal remote control device.

3. The system as recited in claim **2**, wherein the second device comprises a television and the third device comprises a media access device.

4. The system as recited in claim **1**, wherein the first wireless communications channel comprises a radio frequency communications channel.

5. The system as recited in claim **1**, wherein the first wireless communications channel comprises an infrared communications channel.

6. The system as recited in claim **1**, wherein the third device has a second processing device and a second memory having stored thereon second instructions, the second instructions, when executed by the second processing device, causing the third device to perform steps comprising: receiving the signal via use of a receiver of the third device; and using the codeset identifier to cause information required to configure a further device with the one of the plurality of command code sets appropriate to communicate commands to the second device via use of the first wireless communications channel to be displayed on a display device associated with the third device.

7. The system as recited in claim **6**, wherein the first wireless communications channel comprises a radio frequency communications channel.

8. The system as recited in claim **6**, wherein the first wireless communications channel comprises an infrared communications channel.

9. The system as recited in claim **1**, wherein the third device has a second processing device and a second memory having stored thereon second instructions, the second instructions, when executed by the second processing device, causing the third device to perform steps comprising: receiving the signal via use of a receiver of the third device; and using the codeset identifier to automatically configure the third device with the one of the plurality of

command code sets appropriate to communicate with the second device via use of the first wireless communications channel.

10. The system as recited in claim **9**, wherein the first wireless communications channel comprises a radio frequency communications channel.

11. The system as recited in claim **9**, wherein the first wireless communications channel comprises an infrared communications channel.

12. The system as recited in claim **9**, wherein each of the first device and the third device comprises a universal remote control device.

13. The system as recited in claim **1**, wherein the instructions cause the first device to both retrieve from the first location in the first memory the codeset identifier and to transmit the signal in response to a predetermined key entry code being provided to the first device.

* * * * *